



*AccuRay*®

# SERIES "D" PROCESS CONTROL SYSTEMS

for sheet material  
industries . . . .

control of calenders, extruders, rolling  
mills, paper machines, converters,  
coaters, and inspection operations.



***Industrial***  
***Nucleonics***  
CORPORATION

650 Ackerman Rd.  
Columbus 2, Ohio

The WORLD'S LARGEST Manufacturer of Nucleonic Industrial Process Control Systems

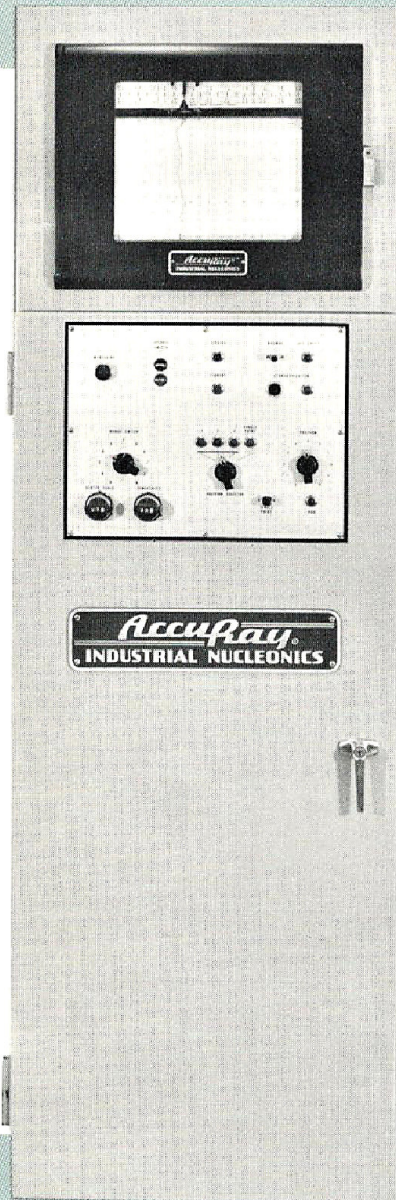


# AccuRay<sup>®</sup>

## Series "D"

Engineered for . . . **PERFORMANCE**

designed to provide maximum economic return



Series "D" Console  
Dimensions

Height .....	75 $\frac{3}{4}$ in.
Width .....	24 in.
Depth .....	24 $\frac{1}{2}$ in.
(without handle)	
Depth .....	26 $\frac{3}{4}$ in.
(with handle)	

The new AccuRay Series "D" electronic design is the latest development of the company's pioneering engineering staff. These engineers have taken into consideration the requirements of industry to provide the finest in production control equipment at a moderate cost.

Series "D" design incorporates features that provide these important performance factors:

- Longterm accuracy of better than 1% is maintained by patented automatic standardization system\* which corrects for both internal and environmental changes through referencing two points on the permanent calibration curve.
- The calibration is permanent and will not be affected by component aging, replacement, or source decay.
- High speed frequency response systems necessary for many control applications and accurate data readout are available as standard. The double loop feedback measurement system\*\* employs both conventional servo and electronic feedback to substantially reduce input time constants. Two switch-selected input time constants are provided as standard.
- A complete range of source geometries, filters and source materials are available to optimize performance on all materials from 0.0002" film through 0.250" steel.
- Custom designed automatic control systems are available to optimize control on all basic processes including calenders, extruders, rolling mills, paper machines, coaters, etc.
- Accuracy is unaffected by such items as sheet pass line change, flutter, bracket deflection, etc.

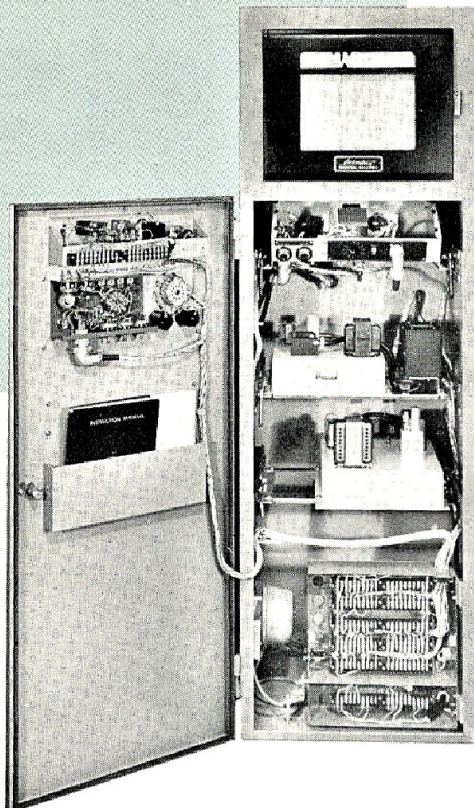
\*U.S. Patent (2,829,268) - \*\*U.S. Patent (2,790,945)

AccuRay Automatic Standardization Systems are "Performance Proved" by over 28,000,000 system hours of operation.



# RELIABILITY..

with emphasis upon combining heavy duty components with ruggedized electronic design.

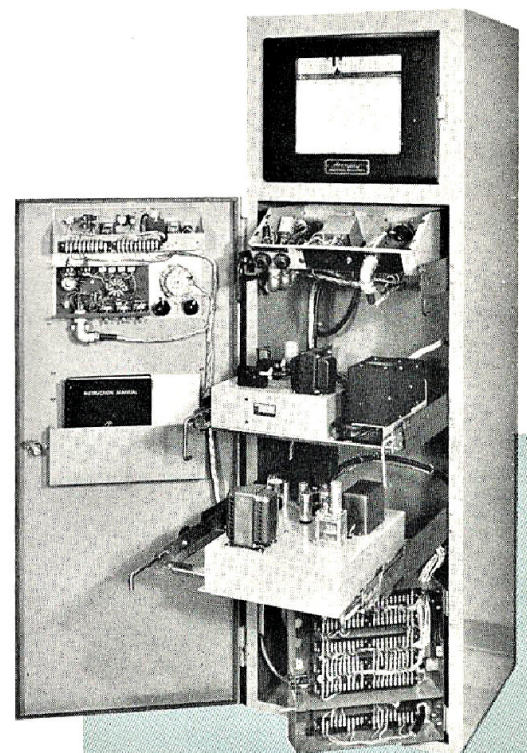


In developing the new Series "D" equipment utmost care has been placed upon selecting components and circuits capable of withstanding severe industrial environments. As a matter of fact, much of the circuitry and components used in the system are identical to those proven dependable in over 12,000,000 system hours of actual plant operation. Reliability of AccuRay Systems is best demonstrated by the fact that 98.7% of all Industrial Nucleonics' systems produced since the company was founded are still in daily operation.

## *AccuRay*

Series "D" Systems are reliable because...

- Independent automatic standardization for both center point and span assures accuracy of direct reading calibration.
- Console gasketed to reduce the effect of dust, moisture, and other foreign materials.
- Functions physically grouped to simplify circuitry and servicing.
- High quality Amphenol-Borg or Beckman-Helipot manufacturer potentiometers used throughout the system.
- Well regulated electronic power supply rather than batteries used to assure continuing measurement accuracy.
- Industrial "red line" tubes used in contrast to standard radio or T.V. type tubes.
- Remote operated Leadex type range switch eliminates carrying measuring circuit leads on control panel door.





# SERVICEABILITY..

a major consideration in the

Ease of maintenance and service is an essential consideration when designing electronic equipment used in process control. Recognizing the exorbitant

While accessibility is the principal reason for using pull-out rotating chassis hinges another advantage of this feature is that the recorder can be easily observed when calibrating the system.

A master set up switch is provided which permits rapid checks of all range potentiometer settings for maximum accuracy.

An aid to preventive maintenance is the standardization adjust pointers located in the control unit. By observing the location of the pointers the maintenance engineer is forewarned of impending trouble and can schedule preventive maintenance accordingly.

No rear access is required to any Series "D" unit.

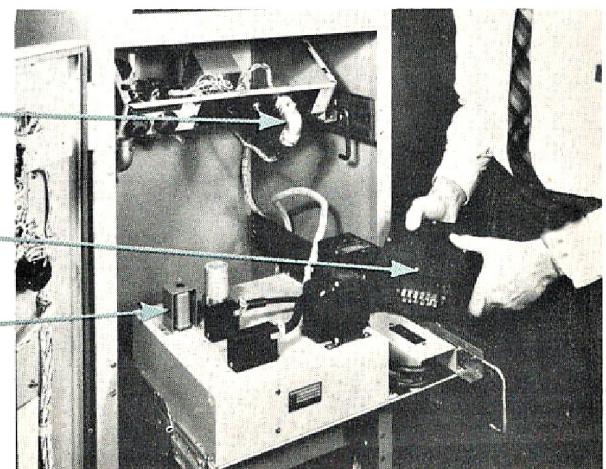
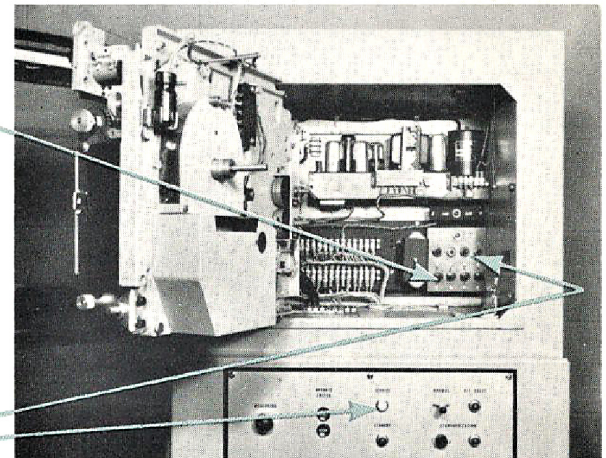
Reset switch eliminates "hand cranking" of standardization servo off its end limit.

Another service feature of Series "D" is the built-in service alarm and trouble locator lights which automatically shut down the system in the event it is unable to satisfactorily complete the standardization cycle and continue accurate measurement. A red alarm light on the front panel signals failure and four internal trouble locator lights indicate the nature of the malfunction to assist in trouble shooting.

AN type connectors are used throughout to permit rapid unit change.

Industrial plug-in timers are used for standardization programming.

Plug-in relays are used throughout the system.





## design of Series "D" Equipment

costs of downtime accountable to equipment failure, Industrial Nucleonics has employed every means to facilitate maintenance and service.

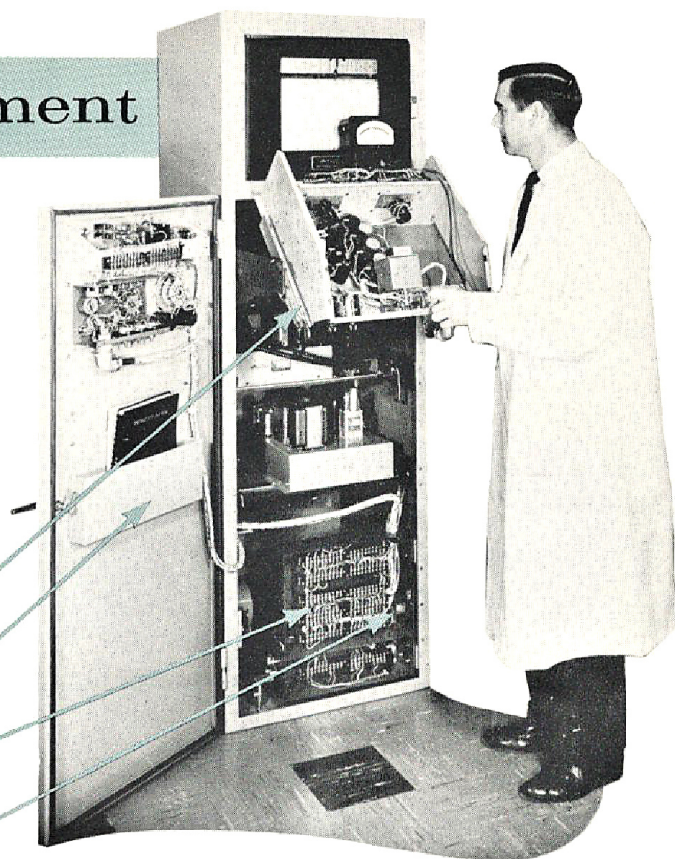
With Series "D" unitized construction, the slide out chassis for the control unit, switching unit and standardization timers, and power supply permit ready access. Each chassis is mounted on slides which allow it to be withdrawn from the cabinet enclosure.

When withdrawn, the heavy duty "Chassis Trak" permits the chassis to be rotated into 8 servicing positions so that all sides can be exposed to the front.

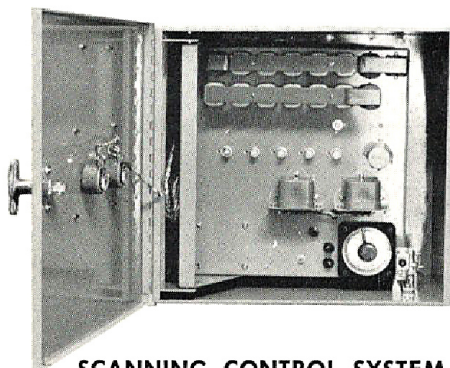
Maintenance log and service manual pocket is located on back side of console door.

All key connections are brought to control junction box to eliminate time consuming "hit and miss" servicing.

High meg indicator light assures operation of high meg temperature stabilization unit.



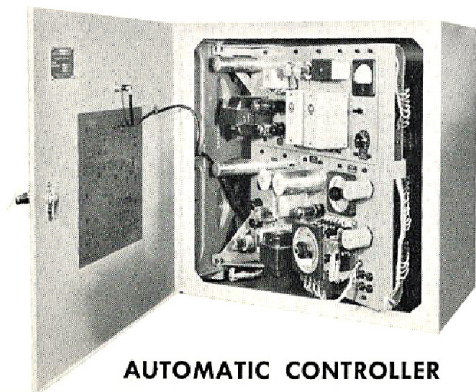
## *AccuRay* Series "D" Remoted Functions



SCANNING CONTROL SYSTEM

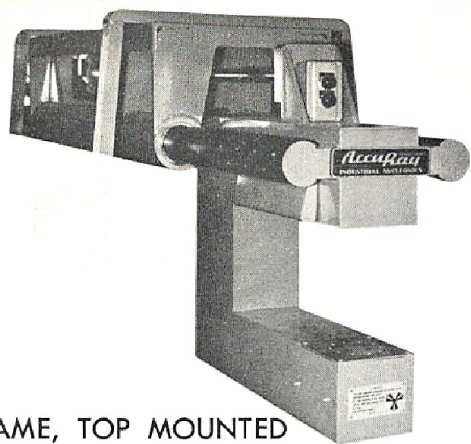
To conserve premium floor space in the area near the process machinery and to make possible the location of electronic cabinets in more desirable environmental areas, all Series "D" functions except the basic measuring console are housed in separate cabinets. Two basic sizes of cabinets are used, a "B" and a "C" size. External dimensions of the "B" size cabinet are 26" wide by 27 1/4" high by 16 1/4" deep, while the "C" size cabinet is 18 1/4" wide by 17 1/4" high by 12 1/4" deep. The cabinets are designed for wall mounting. Electronic equipment is mounted within these cabinets on swing-out panels for maximum accessibility. Point-to-point wiring is used within each cabinet.

Functions contained in the Series "D" remote cabinets include the automatic controller with its associated auxiliary and safety circuits, program scanner, programmed positioner, profile averaging computer as well as various other analog computers, etc. Since not all of these functions are used in a particular system, the approach of housing these various units in smaller cabinets has the advantage of using only that space required and no more.



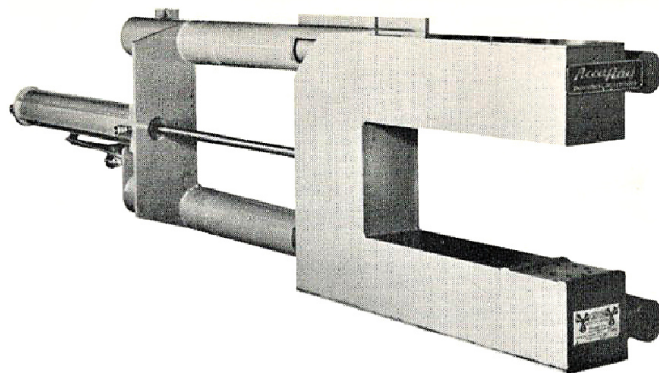
AUTOMATIC CONTROLLER





**"U" FRAME, TOP MOUNTED  
RUGGEDIZED LARGE MILL**

Designed for use on large, high speed steel rolling mills, this "U" Frame constructed of  $\frac{1}{2}$ " thick steel plate, is capable of withstanding the most severe industrial environment. Positioning power is provided by a heavy duty pneumatic cylinder. Available in both Top and Side Mounted construction with 6" and 12" air gaps.



**"U" FRAME, SIDE MOUNTED  
RUGGEDIZED MEDIUM MILL**

This "U" Frame is designed for rugged environmental conditions usually found on metals rolling mills processing relatively thin materials. Constructed of  $\frac{3}{8}$ " thick steel plate, it is positioned by a heavy duty pneumatic cylinder. Available in Side Mounted construction only with 4" and 6" air gaps.

## *AccuRay* MOUNTINGS

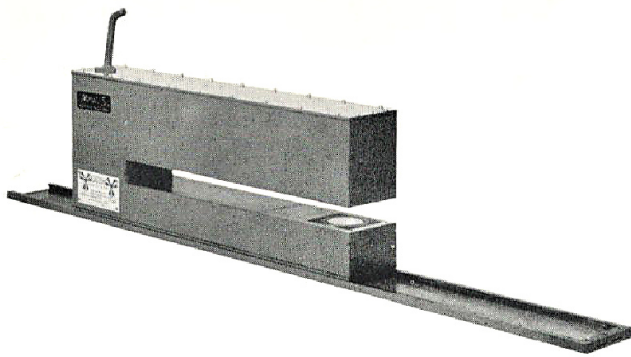
### WIDE "O" FRAME

This unit is designed primarily for use on wide, high speed processes such as paper machines. Measuring heads are electrically driven across the sheet on precision ground steel tubes, supported at intervals by 8" wide flange I-beams. Outstanding design features include large 22" open area between upper and lower members to facilitate high speed threading, removable support on one end to aid threading, small off-sheet space required and ability to handle passline angles up to 25° from horizontal.

### MINIATURE "O" FRAME

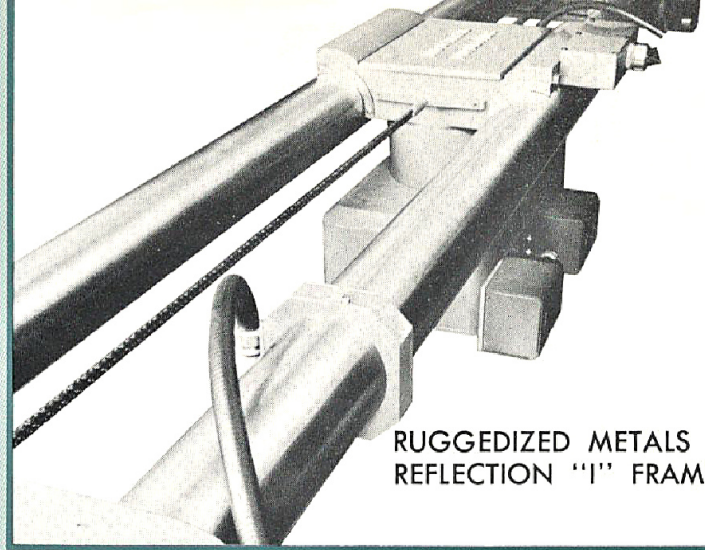
The Miniature "O" Frame is designed to conserve space and for use on relatively slow speed processes such as extrusion, coating and certain calendaring operations. Measuring heads are electrically driven across the sheet on chrome plated precision ground steel tubes. "O" Frame design requires minimum off-machine space. Unit may be mounted to accommodate any passline angle from horizontal to vertical.





**"U" FRAME, BASE MOUNTED  
RUGGEDIZED SMALL MILL**

The Small Mill "U" Frame is designed for use in a variety of applications including small rolling mills and numerous other processes where space is limited and manual positioning is indicated. Constructed of  $\frac{3}{8}$ " thick steel plate and designed for positioning by hand, it is available in a variety of air gaps from  $\frac{1}{2}$ " to 3".



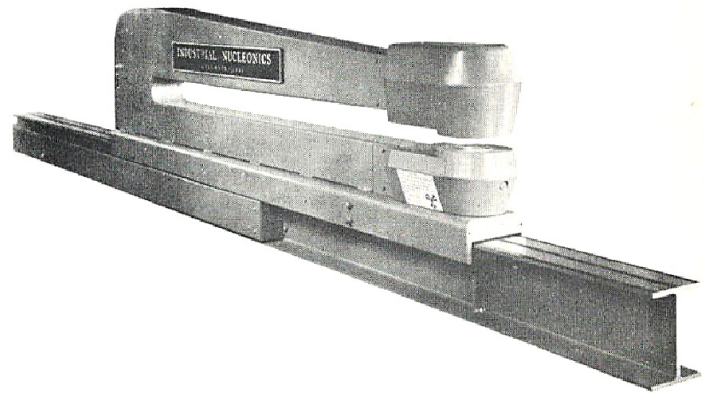
**RUGGEDIZED METALS  
REFLECTION "I" FRAME**

The unit pictured above constitutes one-half of a pair of "I" Frames which operate together for measurement of coating weight on top and bottom of galvanized and aluminized strip. The measuring head is designed for scanning the strip continuously in synchronism with its counterpart mounted under the strip. A variable speed electric motor drives both units.

designed specifically  
for each industry

#### **"U" FRAME, BASE MOUNTED — CAST HEAD**

Probably the most versatile of all source-detector structures is the Base Mounted, Cast Head "U" Frame. The "U" Frame traverses on an 8" wide flange I-beam and can be either electrically or hand traversed. Available in throat depths up to 140", it has been used for practically every type application, excluding heavy duty steel rolling mills.



#### **"U" FRAME, TOP MOUNTED — CAST HEAD**

Another versatile unit is the Top Mounted, Cast Head "U" Frame. Its rigid construction makes it particularly adaptable for use on trimmer machines trimming up to 170" wide. The I-beam traversing rails may be mounted high enough above the sheet to allow the work area to be completely clear when the "U" frame is electrically retracted off-sheet.

